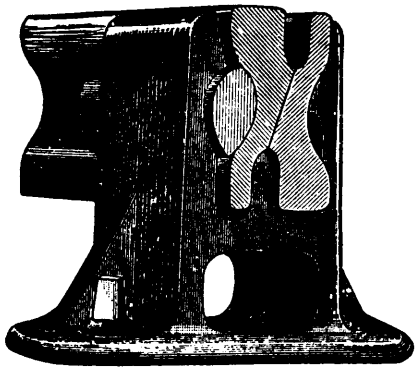
Engineering.

TRAMWAY RAIL EXPERIMENTS.

Tramways are now becoming a subject of great interest to the engineering world and the general public. Improvements in detail are still being continually made; but much remains to be accomplished, and in no direction can more effectual improvement be introduced than in the road and rails. Upon the durability and freedom from repairs of the road depends very much the financial success of the tramway. We may all easily understand the time and money constantly being expended in our streets in taking up large stretches of the roadway to relay tram rails. To minimize this outlay two objects should be kept in view in the construction of the road. In the first place the rails and road should be solidly constructed, and supported so as to offer the best resistance to wear and tear; and, secondly, the rails and attachments should be made so as to offer the greatest facility for removal of the rail without disturbing the roadway. Messrs. Aldred and Spielmann have introduced a split rail and chair. The running over this compound rail is most smooth, and puts an end effectually to many complaints which travellers in tramcars, railway trains, omnibusses, and even cabs, are often ventilating. We may, with advantage, give a synoptical outline of the system here.

Fig. 1.



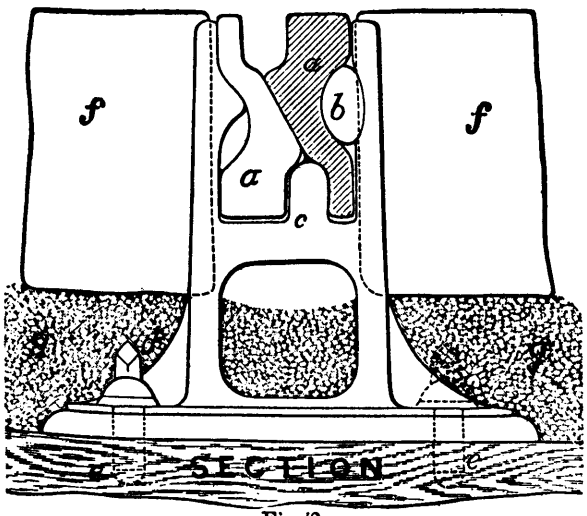


Fig. 2.

The rail is a compound split one, formed from two similar duplicate halves reversed to one another. So that the broad head of one is uppermost, while the narrow head of the other half forms a guard to the broad tread. The two halves of the rail meet one another on an inclined surface, so that the downward pressure on the one half is received and resisted by the other half. When one half is worn out, the rails can be reversed, and the worn half turned down and used for a guard. The split diameter of the rail enables the joint to be made only in one half at a time, so that in no place is the rail wholly broken and dependent only on fish plates for its continuity. The rail has the joint broken only in one half in one place, and always in a chair, the rails overlapping, and thus always forming a continuous and well supported line. The joint in the chair is secured by a wedge or key in the hollow chest of the rail, thus making everything secure at the joint, and entirely dispensing with fish plates and through bolts and punching of rails. This makes the road and metals very cheap, so that a much heavier and stronger road can be made for the same money than the light and flimsy patterns in use. The inventors have sample lengths of line giving great satisfaction in other parts of London and Great Britain, and are now carrying out some large orders. This rail seems to supply a want in tramway roads, and is now being adopted so freely as to induce the belief that the owners of tramways recognize in it a remunerative successor to the old rail.—*Scientific American.*

THE BELGIAN SHIP CANAL.

The ship canal from Ghent to Terneuzen was originally laid out with many bends, rendering navigation difficult; it had a depth of 14 feet 4 inches and a width of 98 feet 6 inches at the water level. The works which are at present in course of execution have especially for their object the deepening of the canal to 21 feet 3 inches, with a width of 55 feet 9 inches at the bottom and 103 feet 9 inches on the water line. The slopes have a uniform inclination of one to 3, and the towing paths on each side are placed at 6 feet 6 inches above the water level, and are 32 feet 8 inches wide. In many instances also the course of the canal has been altered and straightened for the improvement of navigation; several important diversions have been made for this purpose. The excavation has been effected by hand, by dredging, and by the Couvreux excavator, figured on page 8.

The earth excavated was carried to spoil, and in many cases was employed to form dykes inclosing large areas, which served as receptacles for the semi-liquid material excavated by the dredging machines with the long conductors; the Couvreux excavator used will be readily understood from the engraving. It had already done service on the Danube regulation works. The material with which it had to deal, however, was of a more difficult nature, being a fine sand charged with water and very adherent. The length of track laid for the excavator was about 3 miles along the side of the old canal, which had been previously lowered to the level of the water.

THE ENGLISH STEEL SHIP.—It seems that the steel ship built by the British Government is a success, and the London *Times* says that "whatever doubts may have been entertained with respect to the speed performances of the *Iris*, steel despatch vessel, were conclusively set at rest by the long and varied trial to which she was subjected on the measured mile in Stokes bay. She was proved to be not only the quickest ship in the navy, but the quickest ship afloat, having surpassed the highest speed realized by the *Lightning*, torpedo vessel, and even outstripped the most sanguine expectations of Mr. Barnaby, her designer." We read that the *Iris* was in every respect an essentially experimental craft. There was nothing resembling her in the service with reference to the proportion of midship section to length, the extreme fineness of her entrance and run, and the ratio of her enormous horse power to displacement; and as a result there were only very imperfect data to guide the Constructive Department as to her probable performances from the actual performances of previously existing ships. The ship was trimmed by ballast and coal to 15 feet 8 inches forward and 20 feet 6 inches aft, which was near about her load line; and the new experimental four-bladed screws were 16 feet 3 inches in diameter, and had a pitch of twenty feet. The blades were smoothed to prevent friction, and conical caps had been tapped into the bosses over the nuts which secure the screws to the shafts for the purpose of preventing the wave which has been found to follow a bluff ending, whereby the resistance against which the ship has to contend in passing through the water is augmented. The result of the trial was in every respect more than satisfactory. Four full-power runs were made on the mile with the following surprising results: Steam at engines, 62 lbs.; vacuum, 27 inches; revolutions, 96 starboard and 98 port; horse-power, 7,734.85; speed of vessel, 18.572 knots. The engines thus developed fully 700 horses more than the contract, while the ship realized two knots in excess of the speed obtained from the larger screws, and fully a knot more than the Constructive Department anticipated to get out of her.